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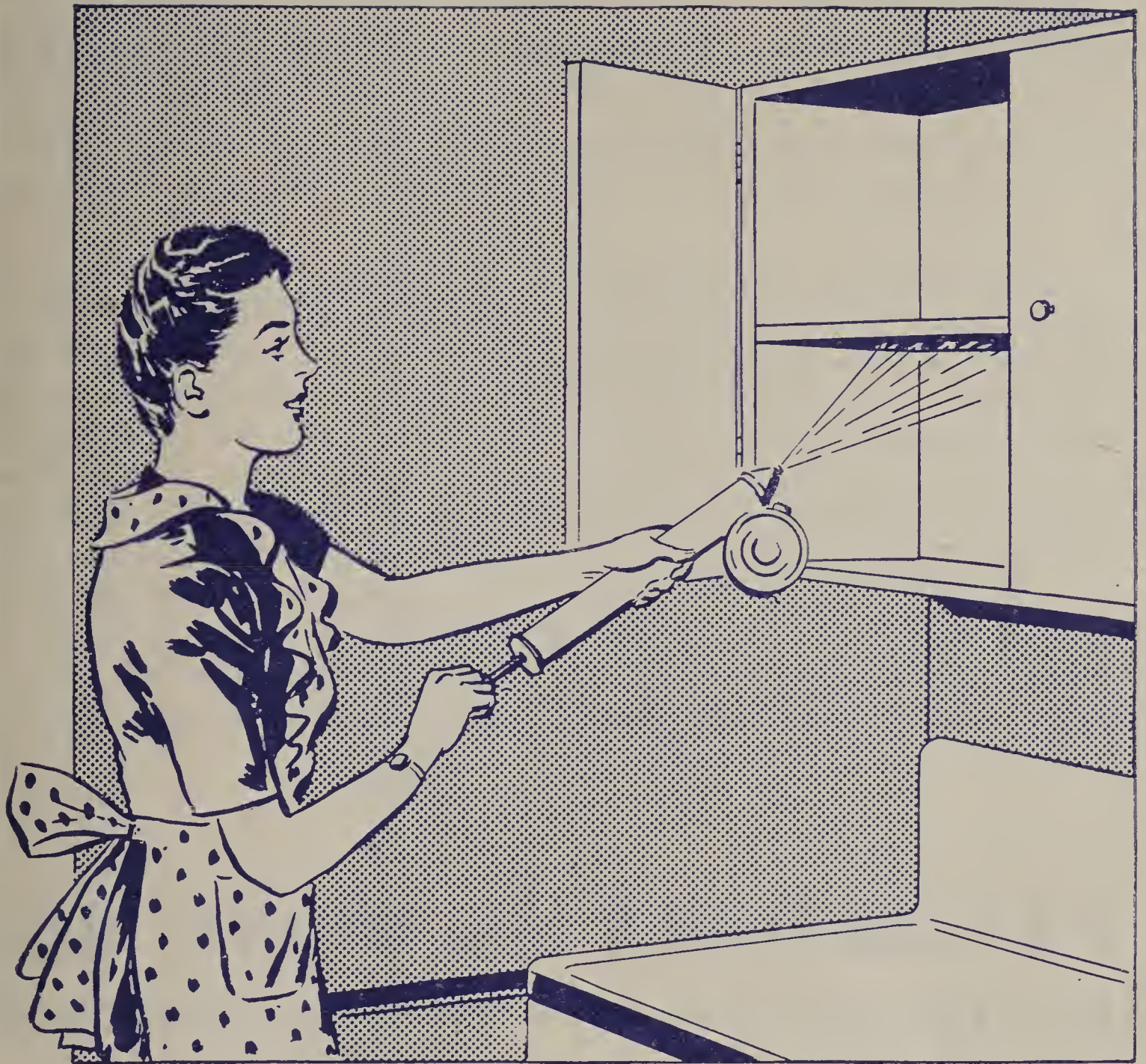
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DDT... FOR CONTROL OF HOUSEHOLD PESTS



Prepared by the
Bureau of Entomology and Plant Quarantine
Agricultural Research Administration
United States Department of Agriculture, and
the United States Public Health Service
Federal Security Agency

Washington, D. C. • Issued March 1947



JUN 9 1947

DDT

This pamphlet contains the latest information on the best use of DDT against household pests.

For additional information write either to the

UNITED STATES DEPARTMENT OF AGRICULTURE,
BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE
or to the UNITED STATES PUBLIC HEALTH SERVICE

Instructions given here in simplified form are meant to guide the individual home owner or apartment dweller in the use of DDT to control household pests. The instructions may not apply to its use in large establishments or commercial operations.

DDT and other insecticides frequently fail under dirty and insanitary conditions. DDT will never

be a substitute for cleanliness and sanitation in the fight against harmful household insects. Basic rules of sanitation will always be helpful in freeing your home of dangerous and troublesome insect pests. Don't forget that DDT is just one of many insecticides and that other insect-control methods may also be desirable or necessary. DDT is, however, a faithful and effective ally of the good housekeeper.

PRECAUTIONS IN USING DDT

DDT is a mild poison but it is safe when used according to these instructions

Take ordinary precautions in handling and storing DDT insecticides.

Avoid applying it on eating utensils and food.

Store it out of the reach of children and where it will not be used by accident for flour, baking powder, or similar foods.

Wash your hands when you have finished applying DDT.

Never use oil preparations of DDT on animals.

Do not spray oil solutions near open fires, because the oil may catch fire.

Remove from the room or cover house plants, fish, and pets when applying DDT.

DDT was first used during the war for military needs by trained experts and under careful observation. It was used successfully to control malaria-bearing mosquitoes, typhus-carrying lice, and other insects threatening the health of our armed forces. From this we know that DDT can be used safely. In the United States not a single case of DDT poisoning in humans has ever been proved when the material was used against insects.

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WHAT IS DDT?

DDT is one of the best insect killers (insecticides) yet discovered, and is extremely useful for the control of household pests. It is obtainable in oil solutions, in wettable powders or concentrated solutions for use in water sprays, in dry or dust mixtures, and in aerosol bombs. It can be bought at drug stores, hardware stores, and other places where insecticides are sold.

DDT is a chemical with a mild pleasant odor. In undiluted form

it is a white, slightly waxy powder, having a tendency to lump. This chemical will not dissolve in water, but will dissolve in liquids such as kerosene and fuel oil. For best use in killing insects, DDT must be prepared in dusts, sprays, or aerosols.

You should know what strength of DDT is required to kill the pest you wish to control (see *How To Use Different Forms of DDT*, p. 5). Then buy preparations which tell exactly what percentage of DDT they contain. Read carefully the labels on the containers of prepared mixtures.

HOW DOES DDT KILL INSECTS?

DDT kills most of the common household pests, such as flies, mosquitoes, ticks, silverfish, cockroaches, moths, fleas, bedbugs, and some kinds of ants. Its action against some of them is slower than that of some other insect killers. Unlike most insecticides, DDT will kill insects on treated surfaces for weeks, and even months, after it has been applied.

The action of DDT is different from that of most other insecticides. Insects do not have to swallow DDT to be killed. They do not have to be hit directly by DDT. They merely come in contact with it as they rest or crawl on a treated surface, and die after they absorb the poison through their feet, legs, and body walls.

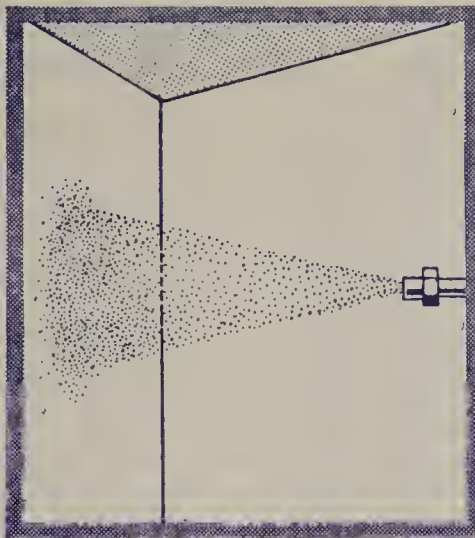
DDT attacks the nervous system of insects. The insect that has received a dose of DDT soon becomes restless, drags its legs, and moves about in a jerky manner. It may crawl or fly away from the

treated area before it loses its power to control legs and wings. After that it becomes paralyzed, has convulsions, and dies.

Don't be disappointed if you find only a few dead insects after you have treated your house with DDT. The absence of live insects, rather than the presence of dead ones, proves the efficacy of DDT.

Since poison crystals cling to a surface after a liquid containing DDT dries, don't add the DDT preparation to any other mixture that might cover the crystals. For instance, it is not generally recommended that DDT be added to oil paint because the dried crystals may be coated with a film layer of paint, and much of the power of the DDT lost. Experimental work in this field may develop methods of using DDT in paints. Tests have shown that DDT loses its power in a short time when put on newly painted surfaces.

HOW TO USE DIFFERENT FORMS OF DDT



Residual spray



Space spray (aerosol)

LIQUIDS

DDT is used in two types of liquid mixtures, residual sprays and space sprays. A residual spray is one that is placed upon walls and other surfaces. Insects are killed when they crawl or rest on the treated surfaces. A space spray is one that is released into the air. Insects are killed when they are hit by the spray.

Residual Sprays

Residual sprays leave a number of poisonous crystals which will kill insects after the sprayed solution dries. It is impossible for you to find and hit all the insects hidden under carpets, house furnishings, and upholstery. Use residual applications of DDT on walls, surfaces, or any place where insects crawl. DDT residues will kill insects as they emerge from hiding places and crawl over treated surfaces looking for food.

Residual sprays should contain about 5 percent of DDT. Solutions of DDT in refined kerosene are satisfactory for use in households. DDT solutions look just

like any other household fly spray. DDT may also be applied as a residual spray made from a wettable powder or concentrated solution specially prepared for mixing in water.

The ordinary household spray gun may be used for applying DDT residual sprays. The most effective use of DDT, however, requires a sprayer that gives a wet spray with as little fog, or mist, as possible. Mist results in waste when residual effects are desired.

If you are going to spray large areas, the best type of sprayer available at present is the air-pressure garden sprayer with a capacity of 2 to 5 gallons. A special nozzle which gives a fan-shaped or flat spray is available for use on ordinary garden sprayers. If the regular nozzle is used, the small size (No. 3) opening plate will deliver the proper amount of spray for coating. If a sprayer is not available, the liquid may be applied with a paint brush. This method is especially desirable for treating window and door screens.

Space Sprays

Space sprays are quick-killing fly sprays containing killing agents to which a small percentage of DDT may have been added. Such sprays kill insects which are hit directly with the spray. As commonly used, they do not contain enough DDT to leave a satisfactory residue on walls and surfaces. Pyrethrum solutions are highly effective as space sprays, and if properly used the addition of DDT is unnecessary. However, if a solution containing DDT is used as a space spray, it should not contain over 3 percent of DDT.

AEROSOLS

Most of the so-called aerosol bombs now available in the stores contain small amounts of DDT and pyrethrum. These aerosols are intended to be used as space sprays and are extremely effective when an immediate kill is desired of flies

and mosquitoes present in a closed room at the time of application. When used repeatedly and directed into hiding places, these aerosols may be helpful in the control of roaches and some other household insect pests. They have, however, limited penetrating properties. Aerosol applications leave little lasting effect, and have virtually no value as a residual spray. Directions for the use of the aerosol, as indicated on the container, should be followed closely.

DUSTS

DDT ground with talc or other materials is used for dusting. The powder or dust for your household needs should contain 10 percent of DDT. An ordinary small hand dust gun is satisfactory for applying DDT dusts. Spread the dust evenly over the surfaces you are treating and blow it into all cracks and crevices.



Hand sprayer



Compressed-air sprayer



Duster

USE OF DDT AGAINST SPECIFIC PESTS

Different insects require different treatment. The best methods found thus far for using DDT for the control of specific household pests are described below.



HOUSE FLIES

Common house flies feed and rest upon excrement, garbage, and other filth before entering your home to crawl over and feed upon your food. In this way they spread diseases such as summer complaint or diarrhea, tuberculosis, and many other serious illnesses. To avoid such contamination and the spreading of disease, as well as to get rid of a great insect annoyance, you should control house flies.

Aerosol and other space sprays are easy methods of using DDT for killing house flies. Space sprays will readily kill flies hit by the spray or mist, but they have otherwise no long-lasting effect.

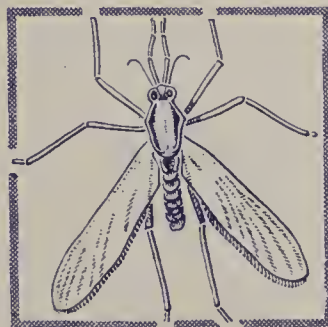
Residual treatments with DDT sprays will be effective for several weeks or months in killing house flies that rest or walk on the treated surfaces. DDT is one of the best materials that you can use for killing house flies.

Residual treatments of outdoor places such as doors, porches, garbage cans, and privies may be made with 5 percent of DDT in oil solutions. The spray should be

applied around the doors, porches, and garbage cans, and to the interiors of privy buildings. Window and door screens should be treated by applying the solution with a brush. Never apply an oil solution where it will fall on plants or vegetation, as the oil will burn plants. There are wettable powders which can be mixed with water and applied where plants are likely to be sprayed.

Treatment of outside surfaces, including screens, will kill many flies before they enter the house and in many cases may keep the inside of the house free of flies. Outside areas may need spraying every 2 to 4 weeks.

If flies get into the house, residual treatments should be applied by spraying a 5-percent DDT oil solution. Pay particular attention to the places where flies normally rest, such as hanging light fixtures, drop cords, edges of arches, and window and door frames. Be thorough in applying the spray to walls and ceilings of rooms where food odors attract flies. A residual treatment inside your house will kill flies for several months.



MOSQUITOES

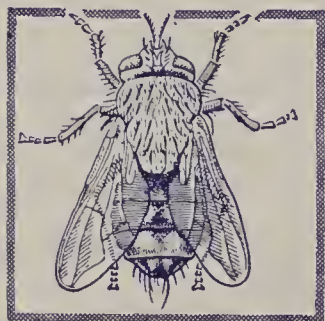
Mosquitoes may carry malaria, yellow fever, dengue fever, and many other serious diseases to human beings.

The interior of houses should be sprayed with DDT so that malaria-infected mosquitoes that rest on the treated surfaces will be killed before they have a chance to bite again and spread the disease.

Fight mosquitoes in houses with DDT in almost the same way that you fight flies. However, since mosquitoes have slightly different habits, you must spray the DDT in different places. The favorite places for mosquitoes to rest are in dark corners, under beds, behind objects, or in other secluded spots. Pay particular attention to the under surfaces of chairs, tables, bookcases, and beds and use the 5-percent DDT solution in treating such places.

It is important to "paint" screens and spray porches with the DDT solution. When applied properly, it will remain effective against mosquitoes for several months. Since mosquitoes may hide underneath a porch or in dense vines or shrubbery around the house, treat such places with a spray containing a wettable DDT powder, which can be used without harm to plants.

Immediate relief from mosquitoes in screened rooms may be obtained by use of space sprays or aerosols, but such sprays have little or no residual effect.

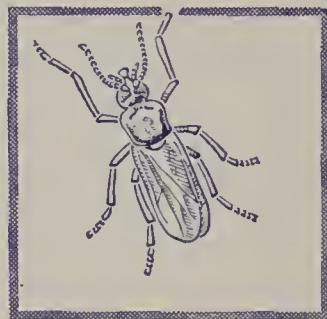


CLUSTER FLIES

Cluster flies are larger than house flies.

They enter houses in the fall to find a protected place in which to pass the winter. They gather in attics and storage rooms, often in great numbers, during the winter and spring months. The flies usually crawl about the floors, walls, and windows in a sluggish manner. They speck walls and are annoying early in the spring when they leave their hiding places.

Cluster flies can be killed by spraying DDT solution on the walls. Pay particular attention to dark places such as closets, or storerooms, and attics. Spray window casings, as cluster flies may enter around them.



SAND FLIES

Tiny blood-sucking gnats, known as sand flies, punkies, or no-see-ums, are

very annoying pests in and about houses and resort areas. They are pale yellow, gray, or almost black, and have spotted wings. Sand flies are attracted to light and are most troublesome on still, warm, moonlight nights, when they enter houses. They are so small that they go through the screens.

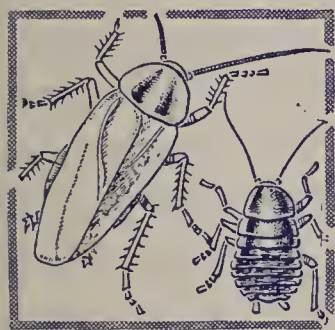
DDT, either in a space or a residual spray, will kill sand flies that enter houses. Apply a residual spray to both sides of window and door screens, and, if necessary, to the walls of rooms. Pay particular attention to surfaces about light fixtures.



FRUIT FLIES

Fruit flies, or vinegar gnats, are small light-brown insects.

They hover about and breed in overripe, decaying, or fermenting fruits or fruit products in the home. They easily crawl through ordinary screening. The best control for fruit flies is the prompt disposal of decaying fruits and garbage containing spoiled fruit products. Rooms already treated with a residual DDT spray for house fly or mosquito control need not be further treated.



ROACHES

Roaches are not only troublesome and destructive but they may also be

carriers of diseases. They often develop and hide in filthy places and may carry disease germs to your food.

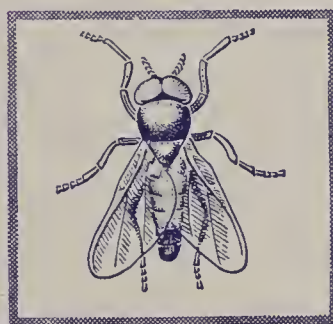
DDT is good for controlling roaches. It is less poisonous than the sodium fluoride used in many roach powders. It does not have the immediate paralyzing effect of some roach powders, but its effect is evident after 2 or 3 days.

Roaches hide during the day in sheltered dark places, usually near sinks, drainboards, behind wall cabinets and radiators, and under loose door and window trims. They come out at night looking for food. Their flattened bodies enable

them to enter through very narrow cracks. As they forage for food, they will come in contact with the DDT and be affected by it.

A combination of dusting and spraying gives best results. With a small hand dust gun, force 10-percent DDT powder into cracks and crevices where roaches hide. Use a 5-percent DDT oil solution for spraying cupboards, drawers, utility rooms, open storage shelves, underneath sinks, and sections of the bathroom where roaches have been seen.

Be sure to remove dishes, food, and drawers from pantries and cabinets, cupboards, sideboards, and tables before you begin to spray. You may return them after the spray has dried. If roaches are present 2 weeks after treatment, repeat the spraying.



BLACK FLIES

Black flies, also called buffalo gnats or turkey gnats, are small insects

which fly about the eyes, ears, and noses of people. They often get under clothing or hat bands, where they inflict sharp and painful bites. These insects are most troublesome in gardens and yards during spring and summer months. If they enter your house, use DDT in the same way that you would against sand flies. Do not apply DDT to your skin to keep them off, for DDT is not a repellent. Use one of the insect repellents now on the market.



CLOTHES MOTHS AND CARPET BEETLES

Clothes moths and carpet beetles are as destructive as roaches and have somewhat similar habits. The use of DDT is almost the same for the control of both pests.

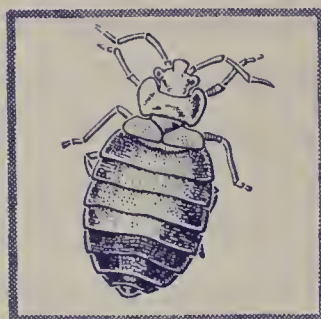
Use a 5-percent solution of DDT for spraying on closet surfaces, floors, carpets, around baseboards, or on other surfaces where the insects are breeding or where they may come in contact with the DDT residue. Remember that DDT differs from moth flakes or crystals in not giving off a gas or odor.

Carpet beetle larvae are killed more slowly than some other insects. In some cases they may not die until 10 days to 2 weeks after their first exposure to DDT, but during this time they will stop their destructive feeding.

In spraying for control of carpet beetles, pay particular attention to cracks in flooring and around baseboards, where the larvae frequently live. A 10-percent DDT powder can also be applied by means of a hand duster. The powder can be blown into the cracks and under carpets. In such places the white deposit of powder is not noticeable.

DDT also protects clothes against these insects. DDT solution can be sprayed lightly on

clothes without injuring any fabric that can be dry-cleaned. Too much of the DDT solution may leave a white deposit on dark fabrics, but it can be removed by brushing or dry cleaning.



BEDBUGS

DDT is the most effective bedbug killer ever discovered.

When it is properly applied, one thorough treatment will last 6 months to a year.

Bedbugs are small, flat, oval insects, which feed only on the blood of man or animals. They feed only at night and hide during the day in cracks or crevices of furniture, behind baseboards, or in any other place which protects them. But wherever they hide, they must come out in search for food. They usually feed every 3 or 4 days.

Apply 5-percent DDT solution to mattresses and bedsteads where bedbugs have been found. Apply it to other furniture, such as chairs and sofas, if they are infested. About half a cup of the insecticide will be enough for a double bed. A small hand sprayer is satisfactory.

DDT doesn't kill all the bedbugs quickly. Some may come out of the walls or from behind picture frames for a week or so. The DDT will get them when they come to feed. The residue of DDT will continue to kill bedbugs for many months, and new bugs brought into the house will be killed before they have a chance to multiply.



FLEAS

Fleas can carry disease to man. Infected fleas carried by rats and other ro-

dents have been the principal source of bubonic plague and are believed to be important carriers of typhus in this country. They are also annoying and irritating pests.

Household pets carry fleas. The sleeping places of your pets are usually the areas most heavily infested, but if your pets have the run of the house, the fleas may spread through all the rooms.

Fleas can be controlled with DDT. One thorough treatment may be enough. A 5-percent DDT oil solution should be sprayed on or beneath rugs and over floors. Treat the sleeping places of your pets thoroughly. You must also spray other places where they are in the habit of lying down. Use a 10-percent DDT dust on the concrete or dirt of cellar floors. Dust the powder into the cracks and crevices in basements, kennels, barns, and in other places where you suspect the fleas are breeding.

Dogs can be dusted safely with about a teaspoonful of 10-percent DDT powder. A line of dust rubbed into the hair along the middle of the dog's back is often enough to kill all the fleas and to prevent them from coming back for a week or more. Do not use the oil spray.

DDT should not be used on cats, as they may lick off enough to poison them. Treat the house and the cat's bed with the 10-percent

powder. That will be enough to get rid of cat fleas.



LICE

Lice can carry typhus fever and trench fever to man. The first practical dem-

onstration of DDT's power as an insecticide was in the control of lice during the typhus epidemic that threatened Naples in the early days of the Italian campaign during World War II. The epidemic was promptly brought under control when our armed forces and the people of Naples were dusted with 10-percent DDT powder.

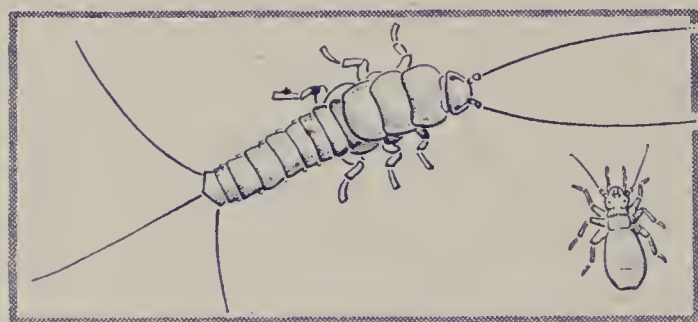
Three kinds of lice live on human beings—the head louse; the body louse, or cootie; and the crab, or pubic, louse. A 10-percent DDT powder is effective against all of them.

Body lice are usually found in clothing next to the skin. Treat the clothing, rather than the body itself. Sift the DDT powder over the entire inner surface of underwear. Take special care to rub it into the seams. Rub it thoroughly into the inside of outer clothing. One treatment should be good for about 3 weeks. Treatments have remained effective against lice even after the clothing has been washed.

Head lice can be killed by rubbing about a teaspoonful of 10-percent DDT dust thoroughly into the hair. This will kill all the crawling lice. Apply a second treatment 8 or 10 days later to kill

any lice that may have hatched from eggs since the first dusting.

Crab lice live among the coarse hairs of the body, particularly about the pubic region and armpits. Dust a 10-percent DDT powder lightly over the infested parts. Rub it in thoroughly. Apply a second treatment 8 or 10 days later.



SILVERFISH AND BOOK LICE

Silverfish and book lice (psocids) infest damp, dark rooms and basements. Silverfish are slender, wingless, silver-colored insects with three long tails and two long feelers, or antennae, on the head. They hide during the daytime and are seldom seen unless they are disturbed. They come out at night and may be found trapped in bathtubs and wash bowls.

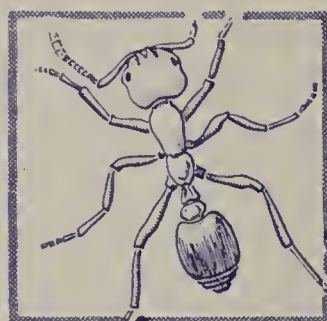
They may come from heated basements by following pipelines to different rooms or apartments. They feed on wallpaper, bookbindings, and starchy materials. They also eat holes in linen, rayon, starched clothing, and curtains.

When basements and attics are infested with silverfish, apply a 5-percent DDT oil spray or a water spray made from wettable DDT powder to all wall surfaces, ceilings, and pipes. Use the water spray if there is a fire hazard.

Spray 5-percent DDT oil solution around all places in the living room where silverfish may hide during the day or where they will crawl over the deposit when they come out at night looking for food.

Book lice look like and are sometimes mistaken for tiny white lice. They are often found in rooms that have been closed or poorly ventilated. They feed on microscopic molds growing on furniture, wallpaper, and other house furnishings. They do not bite man.

In rooms where psocids are seen, spray infested places with 5-percent DDT oil solution.



ANTS

The best way to control ants is to find and destroy the colony. When ants make their mounds of dirt about yards and sidewalks, dusting the hills with 10-percent DDT powder will usually stop their activity.

When ants enter your house, dust 10-percent DDT powder or spray 5-percent DDT solution in cracks and about areas from which ants are emerging to look for food. Spray well about the baseboards and surfaces near food supplies, and the floors beneath tables, refrigerators, cabinets, and sinks. Be sure to treat table legs and bases of cabinets. Another application may be necessary in 2 or 3 weeks.

DDT is effective against some kinds of ants, but has been unsuccessful against other kinds.



TICKS

The American dog tick, also known as the wood tick, is a dangerous pest of human beings because it can carry Rocky Mountain spotted fever in the Eastern States. Although the American dog tick usually feeds on dogs and other animals, it often attaches itself to a person walking in tall grass or wooded areas, and may be brought into homes on the clothing. It never becomes established in buildings.

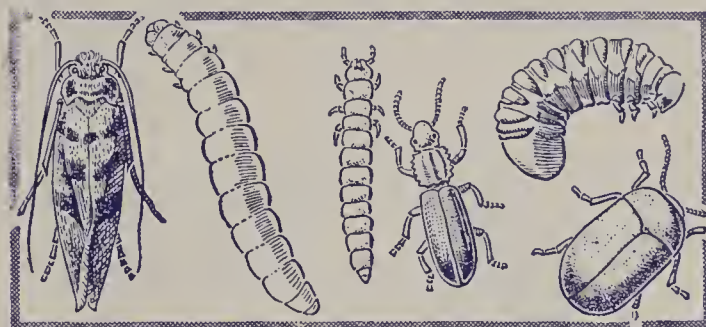
Examine dogs and children when they come in from wooded areas. Remove any ticks you find on them, preferably with forceps. Avoid crushing the ticks, for the body fluid from infested ticks is dangerous. Wash your hands thoroughly after handling ticks or infested animals. Dust infested dogs with about a teaspoonful of 10-percent DDT powder.

Another species, known as the brown dog tick, sometimes becomes an annoying pest in homes, but is not dangerous to human beings. When large numbers are present on a dog, they can become a serious drain on the animal's vitality. The 10-percent DDT powder may be used to rid a dog of this tick.

To control the brown dog tick in the house, spray with 5-percent DDT oil solution, especially in cracks about baseboards, window and door casings, and under rugs and other floor coverings. The

DDT kills ticks slowly. A second treatment may be necessary in about 2 weeks.

Ticks about kennels can be controlled by dusting the kennels with 10-percent DDT powder, or spraying with 5-percent DDT solution. Apply thoroughly to floors and undersides of sleeping pads and bedding.



PANTRY PESTS

Large quantities of food are thrown away because they have become infested with small brownish beetles, pantry pests also known as flour beetles, weevils, or bran bugs. There are also several moths among the pantry pests, the larvae of which look like whitish worms.

Once the food is badly infested, the only thing to do is to destroy or discard it. Don't put sprays or powders into food packages. However, packaged goods that are very slightly infested and still valuable as food can be set well separated in the oven and heated through to a temperature of about 135° F. for 30 to 60 minutes.

Remove everything from the shelves or cabinets and thoroughly clean them. Destroy beetles that may be present by spraying all cracks and shelf space with a 5-per-

cent DDT solution. The spray will dry and leave crystals of DDT, which retain the power to destroy insects crawling about on the shelving among food packages. Let the spray dry before you put the packages back on the shelf.

You don't have to spray kitchen walls if the walls and shelves of the pantry and the cabinets used for food storage are well sprayed. Spraying the storage-space surfaces will not affect insects inside packages.



WASPS AND HORNETS

Wasps may enter the house and sting viciously. The flat, gray papery nests, or the ones made of mud are often attached beneath eaves, on porches, behind blinds, to rafters in an attic, or in any other sheltered place.

Spray the wasp nests well with 5-percent DDT oil solution, or use a duster and blow a 10-percent DDT powder into the nest. Make sure you apply the DDT from beneath the nest, so that it will enter the individual cells. It will be best to wait until the wasps are quiet at

dusk or after dark, in order to avoid getting stung.

When wasps are in attics or rooms, spray a 5-percent DDT oil solution on screens, window frames, or wall surfaces where the insects will be crawling. The DDT deposit will kill them, even though it does not affect them rapidly. The 5-percent solution may also be used in the same way to control wasps that get into attics or closets to spend the winter.

The small yellow jackets build nests in the ground and the larger white-faced hornets build globe-like nests on branches of trees, shrubbery, around houses, gables, eaves, and blinds. These insects are beneficial, but when nests are built close to or on the house, or in shrubbery where children play, they should be destroyed.

One method of controlling yellow jackets and hornets is to blow 10-percent DDT powder into the entrance of the nest with a small hand duster. Get near enough to blow the powder directly into the opening. Wait until after dark when the insects are quiet. Move slowly and cautiously, being extremely careful not to disturb or irritate them and cause them to sting.

| Insect | DDT insecticide recommended | Type of application ¹ |
|--------------------|---|----------------------------------|
| Ants | 10-percent powder or 5-percent solution.... | Heavy |
| Bedbugs..... | 5-percent solution..... | Light |
| Book lice..... | 5-percent solution..... | Heavy |
| Carpet beetles.... | 5-percent solution or 10-percent powder.... | Heavy |
| Clothes moths.... | 5-percent solution..... | Heavy |
| Cockroaches | 5-percent solution or 10-percent powder.... | Heavy |
| Fleas: | | |
| In buildings.... | 5-percent solution or 10-percent powder.... | Light |
| On animals.... | 10-percent powder..... | Light |
| Flies | 5-percent solution..... | Light |
| Hornets | 10-percent powder..... | Heavy |
| Lice..... | 10-percent powder..... | Heavy |
| Mosquitoes | 5-percent solution..... | Light |
| Pantry pests..... | 5-percent solution..... | Heavy |
| Silverfish | 5-percent solution..... | Heavy |
| Ticks: | | |
| In buildings.... | 5-percent solution..... | Heavy |
| On animals.... | 10-percent powder..... | Heavy |
| Wasps | 10-percent powder or 5-percent solution.... | Heavy |

¹ SPRAYS: For a *heavy* application spray all that will remain on the surface without running or dripping; for a *light* application use only enough spray to moisten the surface.

DUSTS: For a *heavy* application use sufficient dust to be plainly visible; and for a *light* application only enough to be barely visible as a thin film.

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